

NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION

*Where
America's
Climate
and Weather
Services Begin*

Strategic Plan 2000—2005

NCEP's Vision

Striving To Be America's ...

- ***First Choice*** for global and national climate and weather analyses, forecasts and guidance
- ***First Alert*** for all climate and weather hazards
- ***Preferred Partner*** in developing numerical models and new weather, water, climate and space weather products and services

Director's Message

As we enter the 21st Century, the meteorological community is celebrating an historic transformation of weather forecasting from an "art" based on subjective reasoning to one secured on a mathematical foundation using sophisticated numerical models. The National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS) have implemented a national doppler radar network, new geostationary satellites, automated surface observing systems and advanced information processing systems. The combined results are stunning. Extreme weather events are now forecast up to 5 days in advance. El-Nino and La-Nina climate patterns have been predicted up to 9 months in advance. The national average lead time for tornado warnings has increased to 12 minutes and for flash floods to greater than 40 minutes.

At the same time, the expectations and desires of our diverse user groups continue to increase. To address the ever-expanding needs across all service areas, the NWS has produced a Strategic Plan called "Vision 2005". The plan links climate, weather and water forecasts to predict extreme weather and hydrologic events 3 to 10 days in advance, improve climate forecasting, extend weather forecasts out to Day 7 and specify the level of certainty of our forecast products.

The National Centers for Environmental Prediction (NCEP) is a central component of the NWS forecast process. With our computer modeling, operations infrastructure and seven Service Centers, NCEP is "Where America's Climate and Weather Services Begin." To reach the "Vision 2005" goals, NCEP must meet enormous challenges by producing analysis, guidance and forecast products that link climate, water and weather, and in the process, foster more effective working relationships among our partners — notably Weather Forecast Offices, the private sector and the research community.

This NCEP Strategic Plan is built upon a service-science legacy that has made us a great organization throughout the past half century. The success of this plan will depend on our ability 1) to listen to our users' needs, 2) to partner with the broader research and operational communities and 3) to capitalize on new science and technology that accelerate service improvements our customers expect — all in a responsive and cost-effective manner. In this era when researchers and operational forecasters have more choices for their weather and climate guidance than ever before, the challenge to remain the effective central component of the NWS is great. For NCEP to be the "first choice" and "first alert" for our users, we must serve and respond — delivering the best products for our customers — when and where they need them most. NCEP must also be the "preferred partner" for the broad hydrometeorological community, translating results from research and academic organizations into improved products which meet our Nation's expanding needs. As Director, I look forward to the challenges that lie ahead as we strive to attain the vision and meet the goals outlined in this Strategic Plan.

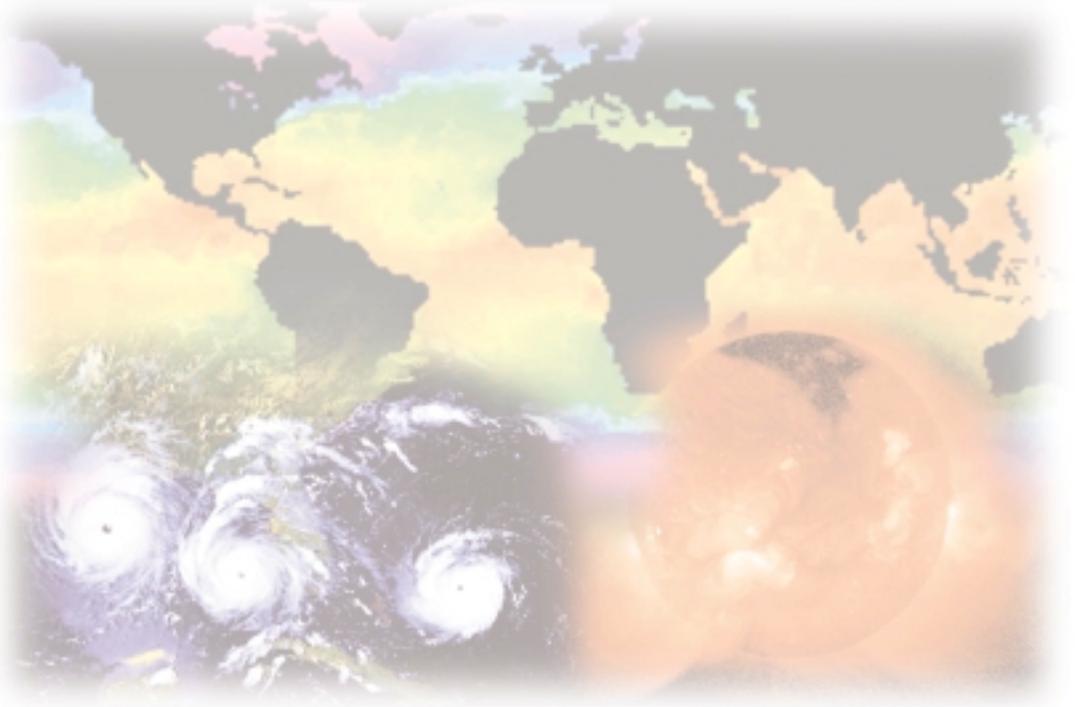
Dr. Louis W. Uccellini
Director, NCEP

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NCEP's Mission — Why Do We Exist?

NCEP delivers national and global weather, water, climate and space weather guidance, forecasts, warnings and analyses to its Partners and External User Communities.

These products and services are based on a service-science legacy and respond to user needs to protect life and property, enhance the nation's economy and support the nation's growing need for environmental information.



***Partners** - Those with whom we work to develop, improve and deliver products and services, including NWS Offices and the Private Sector.*

***Guidance** - Products used by forecasters in making forecasts (e.g., numerical model output, national scale basic weather prognoses ...).*

***Users** - Those who apply NCEP products and services to meet specific needs. These may include NCEP's partners.*

***Environmental Information Database** - The collection and analyses of all data that can be used to assess the impact of the environment on the nation.*

***Service - Science Legacy** - A half-century of improving services through science, especially in numerical modeling.*

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How NCEP Plans to Serve the Nation's Needs

Today, NCEP represents a critical national resource to operational and research communities affected by weather, water, climate and space weather.

To meet the future needs of the ever-broadening user community and address the strategic climate-water-weather issues, NCEP is developing a *Seamless Suite of Products*. The "seamless suite" describes a set of related products which are integrated and consistent throughout time and space, as well as across forecast application and domain. It spans service programs and benefits from enhancements derived from the unprecedented and ongoing explosion of scientific and technological advances within the research community.

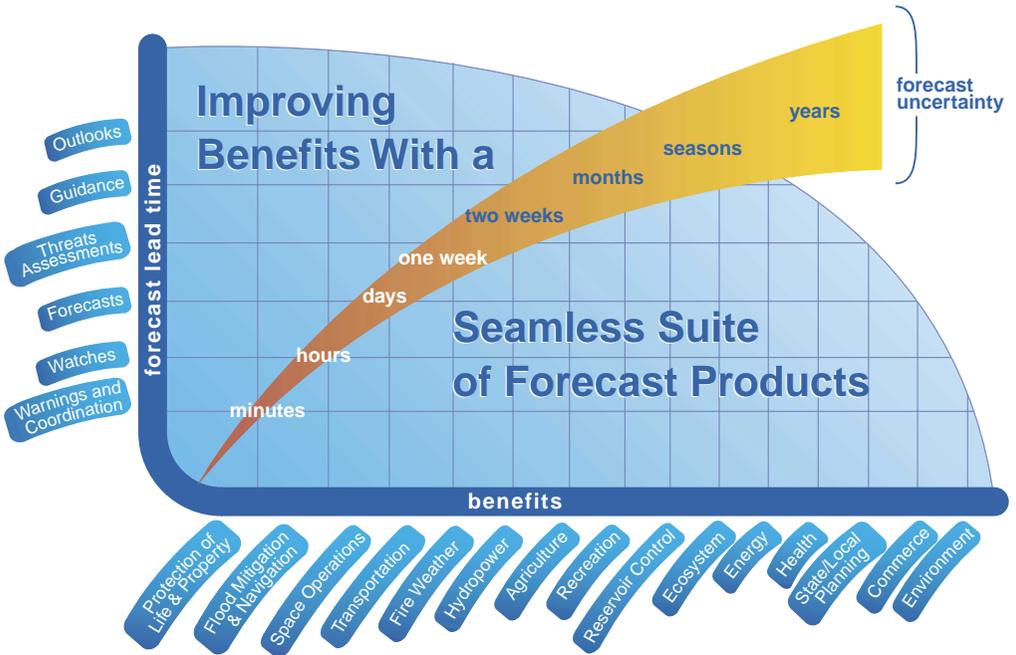
Using today's more powerful computers and sophisticated models, NCEP is now able to establish the necessary linkages between space weather, climate, water and weather services that are essential in supporting a "seamless suite" of NWS products. Benefits of this effort will extend from immediate tactical forecasts related to the protection of life and property to the guidance required to lengthen weather and climate predictions from days to weeks and months and to the long-range effects of climate changes.



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A SEAMLESS SUITE OF PRODUCTS

The “seamless suite” describes a set of related products which are integrated and consistent throughout time and space, as well as across forecast application and domain.



Historically, different user communities required distinct forecast products comprised of a wide range of time scales and areal extents. As a result of these varying demands, climate, water, weather and space weather were treated as separate disciplines, each with its own set of products and users.

- Hazardous weather events such as thunderstorms, tornadoes and hurricanes are short-lived and affect relatively small areas. These events can undergo significant changes on very short time and space scales with considerable damaging effects on life and property.
- Longer range forecasts provide national and global scale day-to-day weather information for the general public and commercial users. These forecasts are generally made up to several days in advance, but can extend to two weeks. These products are widely used in the economic life of the nation.
- Very long-range forecasts span months to seasons and help national, regional and local agencies plan for the impacts of weather.

By melding all of these traditionally discrete products into a seamless suite, NCEP serves as the first alert to the nation for its climate, weather, and space weather needs.

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How NCEP Serves

NCEP produces and delivers products and services to a broad range of users and partners:

- Quality-controlled observations gathered from the nation and around the world.
- Analyses extending from the ocean and the earth's surface into the stratosphere and to the sun.
- Model forecasts, ranging from hours to seasons, for users and partners across the nation and around the world every day — on schedule.
- Forecasts of solar activity, weather, climate, ocean conditions at the surface and below.
- Diagnostics and products derived from model output, including guidance on model performance.
- Forecasts and guidance for specific hazardous solar, climate and weather events.
- Digital national forecasts of weather for public interests, marine activities, aviation and wildfires.
- Discussions which explain forecast reasoning and impact, including climate variability assessments.
- Scientific expertise and support of operational numerical analysis and forecast systems for NWS, community and international use.
- Collaboration on applied research efforts and the development of training material for models and specific forecast problems.
- Outreach with a broad and diverse user community, including media briefings during critical weather and climate events.



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How NCEP Operates

These products result from integrated efforts of nine Centers, each with distinct responsibilities:

The National Centers for Environmental Prediction provides primary support to the NWS mission by furnishing products designed to support National Weather Service field operations, our partners in the Private Sector, other government agencies and the American Public.

NCEP's computer modeling and operations infrastructure support the requirements of the broad user community, the specific needs of NCEP's seven Service Centers and the NWS field forecast structure.

- The **Environmental Modeling Center (EMC)** develops and improves numerical weather, climate, hydrological and ocean prediction through a broad program of applied research in data analysis, modeling and product development in partnership with the broader research community.
- The **NCEP Central Operations (NCO)** sustains and executes the operational suite of the numerical analyses and forecast models and prepares NCEP products for dissemination.



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How NCEP Operates (continued)

The seven NCEP Service Centers rely on their experts to forecast specific weather phenomena.

NCEP supports the field by staffing the Service Centers with highly trained forecasters focusing on hazards related to such areas as severe weather, tropical cyclones, heavy precipitation, marine and aviation weather, global climate and space weather. This ensures that NWS field offices, other government agencies and the nation's private sector have the necessary information to deal with specific hazardous weather occurrences and extreme climate events, whenever and wherever they occur.

- The **Aviation Weather Center (AWC)** provides aviation warnings and forecasts of hazardous flight conditions at all levels within domestic and international air space.

- The **Climate Prediction Center (CPC)** monitors and forecasts short-term climate fluctuations and provides information on the effects the climate patterns can have on the nation.

- The **Hydrometeorological Prediction Center (HPC)** provides analysis and forecast products, specializing in quantitative precipitation forecasts (QPF) to five days, weather forecast guidance to seven days, real-time weather model diagnostics discussions, and surface pressure and frontal analyses.

- The **Marine Prediction Center (MPC)** issues weather warnings and forecasts out to five days, in graphical, text and voice formats for the Atlantic and Pacific Oceans, north of 30 degrees North.

- The **Space Environment Center (SEC)** provides space weather alerts and warnings for disturbances that can affect people and equipment working in space and on Earth.

- The **Storm Prediction Center (SPC)** provides tornado and severe weather watches for the contiguous United States along with a suite of hazardous weather forecasts, mesoscale guidance products and a continuous watch on mesoscale atmospheric processes especially as they relate to severe weather outbreaks, extreme winter weather and fire weather.

- The **Tropical Prediction Center (TPC)** provides official NWS forecasts of the movement and strength of tropical weather systems and issues the appropriate watches and warnings for the U.S. and surrounding areas. The TPC also issues a suite of marine products covering the tropical Atlantic and eastern Pacific.

NCEP's Strategic Goals and Objectives

To achieve synergy and continue to meet the ever-increasing needs of the nation for timely, accurate and consistent weather, water, climate and space weather guidance, forecasts, warnings and analyses, NCEP must:

Improve Products and Services by anticipating user needs better and striving to exceed expectations in product development and delivery.

Capitalize on Scientific and Technological Advances by increasing collaboration with the world's leading scientists in development of improved products, services and numerical models.

Exercise Global Leadership by serving as a catalyst to reduce the impacts of weather-related natural disasters world-wide through applied research, training and technology transfer.

Focus the NCEP Organizational Culture by embracing change, valuing service and promoting teamwork with users, partners and each other.

Manage NCEP Resources more effectively by optimizing their use.



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Improving Services for our Partners and Users

Partners*

- NWS Forecast Offices
- Other Federal Agencies
- State and Local Emergency Managers
- Private Meteorologists
- Universities
- Research Laboratories
- International Organizations
- Technology Vendors
- Military

Users*

- The American Public
- Media
- Emergency Managers
- Federal and State Agencies
- Transportation
- Investment Community
- Public Health
- Agriculture
- Water Resource Managers
- Mariners
- Military
- Energy
- Retail
- Recreation
- Educational Communities
- Scientific Researchers
- Satellite Operations

Infrastructure

- Computers
- Weather/water/ climate models
- Code and computer maintenance
- Model execution
- Communications
- Display and forecast preparation systems

Watches and Warnings

- Hurricanes and tropical storms
- Tornadoes and severe thunderstorm watches
- Aviation hazards
- Marine hazards
- Climate extremes
- Space hazards

Forecasts

- Precipitation amount and probability
- Location and intensity of weather systems
- Fire weather outlooks
- Sea state
- Global winds and significant weather at flight level
- Geomagnetic storms
- Space radiation events

Guidance

- Winter weather, heavy precipitation and convective systems
- 3-7 day temperature, precipitation and weather systems and extremes
- Computer model performance assessments
- Climate probabilities
- Solar cycle

Technology

- World Wide Web
- Modeling
- Data assimilation
- Forecasting techniques
- Model-data postprocessing
- Meteorological workstations

Technical Advice and Consultation

- Training
- Outreach
- International desks
- Satellite applications

Analyses and Data

- Quality-controlled data sets (land, air, ship, buoy, space)
- Routine daily surface, ocean and upper-air analyses
- Historical analyses

*Note – Partners and Users lists are intended to be representative but not exhaustive

NCEP's Strategic Goals and Objectives

1.0 Deliver Better Products and Services

Anticipate user needs and strive to exceed expectations in product and service development and delivery.

- 1.1 Increase *user focus* in developing and delivering NCEP products and services, including innovative use of the Internet.
- 1.2 Fully integrate NCEP products within the NWS *seamless suite* of services that link climate, meteorology and hydrology.
- 1.3 Improve the user's decision-making capabilities by including *levels of certainty* in NCEP products and services.
- 1.4 Extend the *detail and accuracy* of guidance to support weather forecasts out to 7 days and climate forecasts from 2 weeks to one full year, with a focus on hazardous events.



User Focus - Working with our users and partners to assure their needs are understood and met.

Seamless suite – Related products integrated and consistent throughout time, space and across forecast domain and applications, fully coordinated among all service centers.

Levels of certainty – A measure of the likelihood that a weather event will affect a particular user community.

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NCEP's Strategic Goals and Objectives

1.0 Deliver Better Products and Services (continued)

- 1.5 Fully *integrate* NCEP products *into the NWS forecast process* for all service areas and for all Regions.
- 1.6 Expand product suite to serve "New Frontiers."
 - 1.6.1 Diverse Users
 - Emergency Managers
 - Air Quality Agencies
 - Water Resource Managers
 - Other Government Agencies
 - Emerging Markets
 - 1.6.2 New Product Areas
 - Probability of Climate Extremes and Weather Events
 - Real-time Computer Model Assessments
 - Storm-scale Forecasting
 - Gridded Quantitative Precipitation Forecasts
 - Wind Hazards
 - Health and Economic Impacts
 - Aviation Collaborative Convection Forecast Product
 - Space Weather
 - Transportation (Land and Marine)

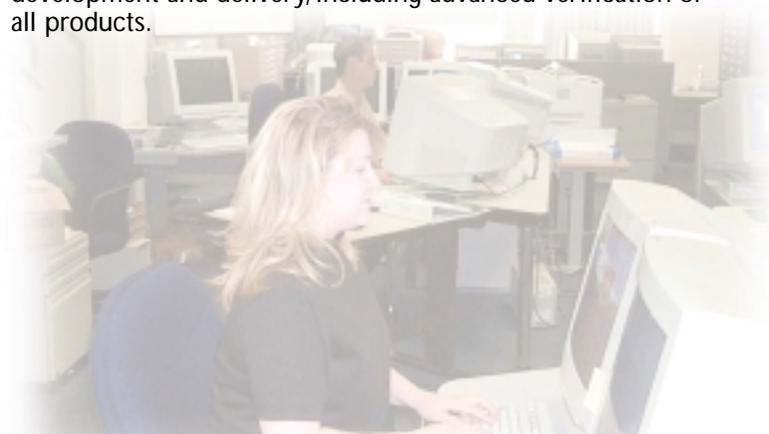


NCEP's Strategic Goals and Objectives

2.0 Capitalize on Scientific and Technological Advances

Increase collaboration and cooperation with the world's leading scientists and academic partners in the development of products and services spanning the spectrum from local to global scales and from short-term weather to long-term climate and space weather. Accelerate new advances in science and technology into the NCEP models and service centers.

- 2.1 Develop next-generation, easy-to-enhance numerical forecast systems based on a *community model approach* that serves both the operational needs of the NWS and the research needs of the broader community.
 - 2.1.1 Advance *data assimilation* and rapid assessment of new data (especially satellite and radar data) for weather, water, climate and space weather forecast applications.
 - 2.1.2 Fully *couple* land-surface and ocean forecast models within NCEP's operational weather, ocean and climate forecast systems.
 - 2.1.3 Develop and deliver *distributed models* to users and partners.
 - 2.1.4 Ensure *continuous improvement* in product and service development and delivery, including advanced verification of all products.



Community models – Models developed jointly by the research and operational communities — using common frameworks which speed improvement and broaden application.

Data assimilation – Process by which observations from the nation and the world are used to produce analyses and numerical prediction for the Atmosphere, Oceans, Land Surface and Space, including remotely-sensed data.

Coupled models - Computer models in which changes to the land- or ocean-surface can affect weather and climate forecasts.

Distributed models - Models run when and where you need them most.

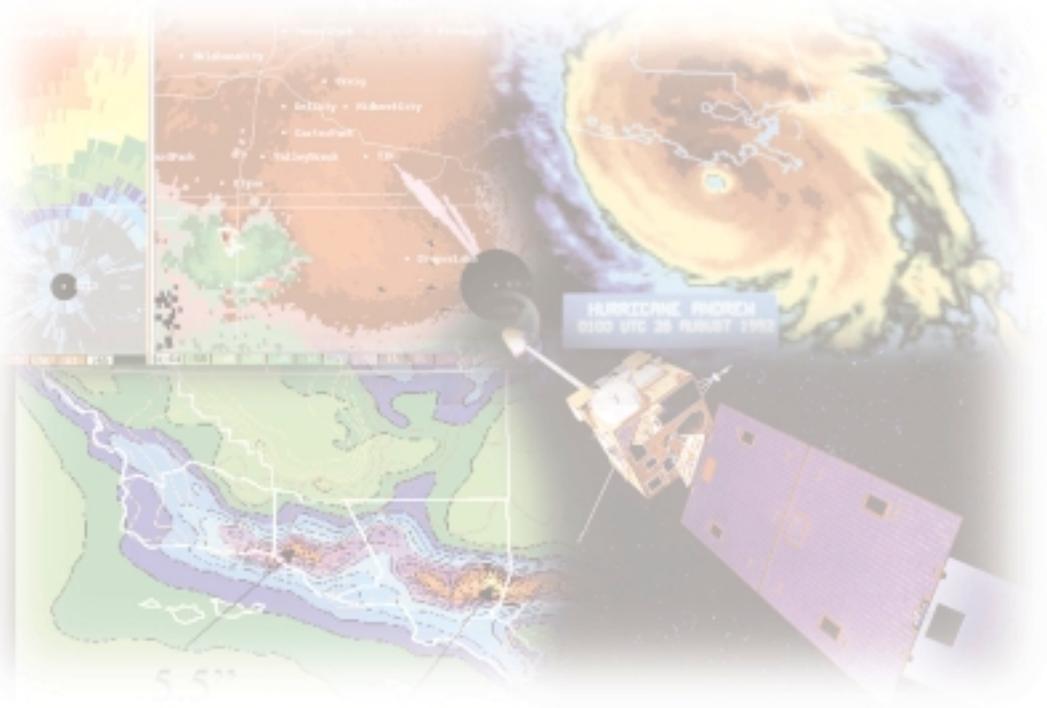
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NCEP's Strategic Goals and Objectives

2.0 Capitalize on Scientific and Technological Advances

(continued)

- 2.2 Develop integrated information technology strategies.
 - 2.2.1 Foster the use of advanced information processing techniques and the full use of computer model output in NCEP's forecast processes, especially through *workstation-based* product development and a coordinated Internet strategy in *all* Service Centers.
 - 2.2.2 Increase the "*power at the desktop*" for all NCEP employees to improve productivity, service delivery and personal satisfaction.
- 2.3 Respond to changing user needs and technology advances with a *highly trained and adaptable* workforce.



Power at the desktop - Sufficient computing power and appropriate software within easy reach of all employees — from secretaries to administrators, forecasters and modelers.

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NCEP's Strategic Goals and Objectives

3.0 Exercise Global Leadership

Serve as a catalyst to reduce the impacts of weather-related natural disasters worldwide through applied research, training and technology transfer.

- 3.1 Cooperate and collaborate in *global and regional modeling* activities, including transfers of NCEP modeling technologies with other nations and the full utilization of probabilistic ensemble model runs.
- 3.2 Increase the *reliability, accuracy and impact* of forecasting systems around the globe in ways consistent with World Meteorological Organization Programs, such as the World Weather Watch, the International Space Environment Service and the World Weather and Climate Research Programs.
 - 3.2.1 Expand NCEP's international training programs.
 - 3.2.2 Share advanced weather forecasting techniques and support international response to climate and weather disasters.
 - 3.2.3 Participate in international programs and experiments.
 - 3.2.4 Conduct global model assessments with the international community in using satellite data sets.
- 3.3 Increase the flow of *new data sets* from around the globe into all NCEP models and analyses.
- 3.4 Improve NCEP model forecasts through interactive and *collaborative data and product assessments*.



Focus Areas - Tropical Prediction - Severe Weather - Precipitation - Numerical Weather Prediction - Space - Marine - Climate - Aviation

NCEP's International Training Programs - International forecasting partners learn and apply advanced forecasting techniques with NCEP.

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NCEP's Strategic Goals and Objectives

4.0 Focus the NCEP Organizational Culture

Promote an organizational culture which embraces change, values service and promotes teamwork with users, partners and each other.

External Focus

- 4.1 Encourage *all users* to be full participants in planning and product evaluation activities.
- 4.2 Engage *all partners* fully in leveraging development and product improvement processes.
- 4.3 Expand *outreach and education* to increase awareness and understanding of how NCEP's forecasts are made, what value they provide to users and why NCEP is where climate and weather services begin.
- 4.4 Ensure inflow of *new talent* by enlarging and strengthening educational relationships including student mentoring and faculty-level instruction by NCEP staff.

Internal Focus

- 4.5 Improve NCEP's *cooperation and collaboration* among Centers to support the seamless suite of products.
- 4.6 Embrace *partnerships* between all Centers and:
 - Weather Forecast Offices - River Forecast Centers
 - Center Weather Service Units - NWS Regions and Headquarters
 - NWS Employees Organization.
- 4.7 Ensure product *accuracy and validity* through verification of all products.
- 4.8 Develop an integrated NCEP-wide *science and technology transfer* planning process, including well-defined procedures and standards.
- 4.9 Increase *under-represented groups* throughout NCEP.
- 4.10 Enhance *job satisfaction* through recognition, rewards and professional development for all NCEP employees in the spirit of *Quality Through Partnership*.
- 4.11 Furnish a first-rate *working environment* based on world-class research and operational *facilities* with solid linkages to the University and Research communities.

Culture - Values, attitudes, behavior and practices.

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5.0 Effectively Manage NCEP Resources

Maximize the use of total NCEP resources and expertise and evolve toward a virtual organization.

- 5.1 Improve the *delivery* of a seamless suite of internally consistent products that covers all scales of weather, water, climate, ocean and space weather, with easy access to products and services at any place at any time.
- 5.2 Improve NCEP's *business practice*:
 - 5.2.1 Develop continually improving annual technical and operating plans which map all resources and allocations to NCEP operational and research tasks.
 - 5.2.2 Streamline NCEP planning, acquisition and budget processes and implement a technology infusion process.
 - 5.2.3 Ensure that scientific and technological advances influence acquisition decisions.
 - 5.2.4 Improve decision-making capabilities by applying advanced risk management techniques to all NCEP products.
 - 5.2.5 Develop cooperative alliances with external partners.
 - 5.2.6 Plan for and place decision and budget authority at the lowest and most effective levels.
- 5.3 Provide a strong foundation for excellence in NCEP products and services with *world-class Information Technology* capabilities and support systems.
- 5.4 Promote excellence in *Information Technology Infrastructure* through programmatic and budgetary priorities for acquisition and implementation of state-of-the-art technologies.
- 5.5 Strengthen *links with technology vendors* to implement the world's best systems for operational forecasting.
- 5.6 Improve *backup operations* by developing the capability to run operational NCEP models at other sites.

Virtual organization – Groups of individuals able to interact at any time.



Aviation Weather Center
Kansas City, MO

Central Operations
Camp Springs, MD

Climate Prediction Center
Camp Springs, MD

Environmental Modeling Center
Camp Springs, MD

Hydrometeorological Prediction Center
Camp Springs, MD

Marine Prediction Center
Camp Springs, MD

Space Environment Center
Boulder, CO

Storm Prediction Center
Norman, OK

Tropical Prediction Center
Miami, FL

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Links are available to all web sites through the NCEP home page:
<http://www.ncep.noaa.gov>

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